Title: DEVELOPMENT OF A BINOCULAR RIVALRY TESTING SYSTEM FOR LARGE-SCALE PSYCHIATRIC AND GENETIC STUDIES

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Introduction: When different stimuli are presented simultaneously, one to each eye, perceptual alternations occur between each image every few seconds. Such binocular rivalry (BR) has intrigued vision scientists for nearly two centuries and the methods by which BR is presented (usually in small-scale studies) have been mostly confined to expert psychophysicists. It has been demonstrated that BR rate is slow in bipolar disorder (BD) [1], a psychiatric condition with high heritability. It has also been shown that BR rate is itself around 50% heritable [2]. These findings have led to establishment of a large-scale multi-centre consortium to investigate slow BR rate as an endophenotype for BD [3]. Methods: We describe the development of a prototype, user-friendly BR testing system for use in such large-scale studies and for operation by non-specialised research staff. The system is currently operational, or is in the process of being installed, at the following sites: Monash Alfred Psychiatry Research Centre (P.B. Fitzgerald), The Geelong Clinic (M. Berk), UNSW (P.B. Mitchell), Cade Clinic (G.S. Malhi), Queensland Institute of Medical Research (N.G. Martin & M.J. Wright), Royal Brisbane & Women's Hospital (J.G. Scott), Cardiff University (D.J. Smith), and University of Göttingen (T.G. Schulze). Results: The BR system consists of a PC with enhanced PSU capability and an Eyefinity-enabled video card, which is connected to both a conventional monitor (for data collection/analysis via a single GUI) and a specialised True3Di™ monitor for stimulus presentation. The system also has an accompanying manual which provides step-by-step details of the entire testing procedure. Conclusions: We have developed a BR testing system that is well suited to large-scale psychiatric genetic studies and use by non-specialised research staff. Its ease of operation will facilitate new groups joining the national/international consortium, thus enabling the large Ns required for endophenotype-based GWAS of BR and BD. Keywords: 1. endophenotype 2. bipolar disorder 3. binocular rivalry References: [1] Pettigrew, J.D. and Miller, S.M. (1998). A 'sticky' interhemispheric switch in bipolar disorder? Proc Biol Sci 265, 2141–2148. [2] Miller, S.M., Hansell, N.K., Ngo, T.T., Liu, G.B., Pettigrew, J.D., Martin, N.G. and Wright, M.J. (2010). Genetic contribution to individual variation in binocular rivalry rate. Proc Natl Acad Sci USA 107, 2664–2668. [3] Ngo, T.T., Mitchell, P.B., Martin, N.G. and Miller, S.M. (2011). Psychiatric and genetic studies of binocular rivalry: an endophenotype for bipolar disorder? Acta Neuropsychiatr 23, 37–42.